

OUT LINES

OF THE

Lectures on Chemistry



FIRST DIVISION OF THE COURSE.

GENERAL PROPERTIES OF MATTER ;

Embracing a statement of the laws relating to those agents or forces concerned in the production of chemical which are phenomena.

1. ATTRACTION,

A. Remote—or Gravitation.

B. Contiguous—subdivided into two kinds: Cohesion and Affinity.

1. COHESION.

Acts as antagonist force to caloric.

Degrees of this property in different bodies.

Effects of temperature.

Action of liquids.

Methods of overcoming the cohesion of bodies.

1 By heat. 2 By mechanical power. 3 By the agency of affinity.

Production of crystalline forms. 1 By cooling from

The capacity for heat exhibited by different bodies is very unequal. Methods of determining the capacity of solids, liquids and gases.

Specific heat, means the *relative* capacities of different bodies, compared with some standard. The standard for solids and liquids is water, and for aeriform bodies, common air.

The capacity of a body is altered by a change in its density; thus compressing air disengages caloric: but when it is rarified, there is an absorption of heat in consequence of an enlargement of capacity.

Formation of clouds explained.

The absolute quantity of heat which any body contains is unknown. Discordant calculations on this subject.

STEAM AND VAPOUR.

Bodies in passing from a liquid to an aeriform state absorb a vast quantity of heat.

The boiling of a liquid is caused by the rapid formation and escape of vapour. The production of vapour in smaller quantities and proportionate to the temperature takes place before ebullition commences.

The relative volumes occupied by the same substance in the solid or liquid, state, and in the form of gas, are very different.

Steam, at the pressure of the atmosphere, is more than 1800 rarer than water.

The boiling point of every liquid is invariable while the

pressure remains the same ; but is lowered when the pressure is reduced.

Influence of altitude on the boiling of liquids.

In vacuo ebullition takes place at 120° F. less temperature than in the open air.

On the contrary, increasing the pressure, raises the boiling point. In a strong vessel, water may be heated red hot without boiling. Papin's digester. Perkin's steam-gun.

The elasticity of steam increases in a constant ratio with the temperature, i. e. it is doubled for every 40° F

Capacity, of latent heat of steam : how determined.

Production of cold by rapid evaporation, caused by the large quantity of caloric absorbed by the vapour. Freezing of water by evaporating ether on its surface.

Of the steam engine. Savary's and Newcomen's engines. Mr. Watt's improvements. High pressure engines.

Equal weight of steam contains the same quantity of caloric : its latent heat diminishing as its sensible heat increases.

Evaporation in vacuo is facilitated by the absorbing power of sulphuric acid or other materials. Mr. Leslie's method of freezing water.

Influence of evaporation or insensible perspiration, on the temperature of living animals.

Persons may endure, with little inconvenience, air heated far above the boiling point of water, if their bodies perspire freely.

Manner of cooling liquids by evaporation.

Explanation of the *cryophorus* of Dr. Wollaston, and of the *pulse glass*.

Distillation. Different vessels for performing this operation described. Distillation in vacuo.

Ignition or incandescence.

The temperature at which solid bodies become red hot is probably about 810°F . Air cannot be heated so as to become luminous, except when it is in the state of flame. The luminousness of heated bodies is not satisfactorily accounted for.

SOURCES OF HEAT.

- 1 The solar rays. 2 Electricity. 3 Mechanical action.
- 4 Chemical action. 5 Vital action.

ELECTRICITY.

General remarks

Electrical phenomena observed when glass, sealing wax, &c. are subjected to friction. 1 Attraction and repulsion 2 Peculiar sensation. 3 Noise. 4 Light.

Division of bodies into *electrics* and *non-electrics*: also into *conductors* and *nonconductors*.

Insulation.

Circumstances affecting the conducting power of bodies.

Difference in the electrical phenomena of bodies excited by different electrics.

Bodies similarly electrified repel each other : but when excited with electricity of different kinds, they attract each other.

Circumstances which determine the *kind* of electricity, when any particular electric is excited.

Electricity may be excited by friction, compression, expansion, fusion, evaporation, crystallization, &c.

The forces of electrical attraction and repulsion are inversely as the squares of the distances.

Experiments on bodies charged with the two electricities.

Phenomena of induction, or electricity excited by the influence of a charged body at a distance.

Franklin's theory of electricity.

Du Faye's.

Electrical machines : essential parts ; theory of their action.

Experiments with the electrical machine.

Rapidity with which the electrical influence traverses conductors.

Electrical, attraction and repulsion.

Inflammation of various combustibles.

Influence of points, &c.

Electrometers. Gold leaf. Quadrant. Discharging, &c.

Electrophorus, theory of its action.

Electrical spark.

Washington, D. C. 20540

10/1/77

Dear Mr. [Name]

I am writing to you regarding the [Subject]

which was discussed at the [Meeting]

on [Date]. I am sorry that I cannot

provide you with a more definitive answer

at this time, but I am sure that you

will understand the need for further

study in this area. I will be sure to

keep you informed as soon as I have

more information.

Sincerely,

[Signature]

[Name]

[Title]

[Organization]

[Address]

[City, State, Zip]

[Phone Number]

[Fax Number]

[E-mail Address]

a state of fusion. 2 Deposited from vapours. 3 From a solution. Definition of solution.

Influence of temperature on the solvent power of fluids.

Some substances equally soluble in hot as in cold water, &c.

How crystals increase in size. Method of obtaining them perfect and large.

Influence of a nucleus, threads, &c. on the crystallization of bodies.

Modification of form in consequence of foreign substances in the solution.

Circumstances which retard crystallization. Saturated solutions removed from the pressure of the atmosphere.

Production of crystals influenced by electricity.

Efflorescence. Deliquescence. Watery fusion.

Rapid crystallization produces heat.

Force with which water expands in freezing

ATTRACTION, OR AFFINITY.

It unites dissimilar particles and produce compounds possessed of new properties.

Sometimes feeble, as when a salt unites with water. Saturation. Proper chemical action is attended by remarkable phenomena.

Change of properties by the union of dissimilar bodies exemplified by experiments.

1 Of chemical properties. 2 Of form. 3 Colour. 4 Density. 5 Temperature.

Chemical action influenced by cohesion. Most powerful



in liquids, and rarely takes place where the acting bodies are both in a solid form.

Influence of elasticity on affinity.

How the union of mixed elastic fluids or gases is effected:

1 By pressure. 2 By heat. 3 By electricity.

Vapours of dissimilar bodies have a strong tendency to combine.

Solids unite with gases more readily when their cohesion is diminished.

Union of elastic fluids with liquids and solids.

When a body is capable of combining with a number of others, it attracts them unequally. Hence the ingredients of compounds may be disunited by the agency of superior affinity.

Experiments in illustration of this proposition.

Some bodies appear to have no affinity for each other.

Union of two bodies by the intervention of a third body.

Methods of determining the degree of affinity which a body may possess towards a number of others.

Tables of affinity. Geoffroy's. Kirwan's. Objections.

Double decomposition. Diagrams for illustrating it.

Neutrality which is observed after the decomposition of two salts.

Chemical equivalents, or equivalent numbers explained.

Uniformity of composition in compounds.

Different, but definite, proportions in which bodies combine

Law of multiples. Combinations of gases.